$=\frac{\pi^2\mu ac^2}{2}(4a^2+3c^2)\ldots(2)$, in which μ is used instead of δ, and the result is twice as great as given in the statement of the problem.

The advantage of this method lies in the fact that it is general for A and k^2, which are therefore the only quantities to be worked out before setting down the special result.

II. Solution by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in New Windsor College, New Windsor, Maryland.

According to well-known principles $V=\pi a^2\times 2\pi c=2\pi^2 ac^2$, $M=V\delta=2\pi^2\delta ac^2$, and the Radius of Gyration$=X=\sqrt{(\frac{1}{2}a^2+\frac{3}{8}c^2)}$. Hence the required Moment of Inertia, *Nystrom's Mechanics*, becomes $E=MX^2$ $=\frac{1}{4}\pi^2\delta ac^2(4a^2+3c^2)$.

III. Solution by ALFRED HUME, C. E., D. Sc., Professor of Mathematics in the University of Mississippi.

If the center of the generating circle be taken as the origin and a perpendicular from this point to the axis of revolution as the axis of x, the equation of the moving circle is $x^2+y^2=c^2$.

Divide the ring formed into layers of infinitesimal thickness, dy, by planes parallel to the plane of the director circle.

The moment of inertia of any layer whose external radius is $a+x$ and internal $a-x$ is $\left[\frac{\pi}{2}\rho(a+x)^4-\frac{\pi}{2}\rho(a-x)^4\right]dy$, ρ being the density.

Therefore the moment of inertia of the entire ring is

$4\pi\rho a\int_{-c}^{c}(a^2+c^2-y^2)(c^2-y^2)^{\frac{1}{2}}dy$, substituting c^2-y^2 for x^2.

Performing the integration the result is $\frac{\pi^2\rho ac^2}{2}(4a^2+3c^2)$ which is double that given by Price.

This problem was also solved by *W. Wiggins, G. B. M. Zerr, and P. H. Philbrick*. Their solutions will be published next month.

PROBLEMS

20. Proposed by CHAS. E. MYERS, Canton, Ohio.

A flexible cord of given length is suspended from two points whose co-ordinates are (x, y) and (x', y'). What must be the condition of the cord in order that it may hang in the arc of a circle?

21. Proposed by J. A. CALDERHEAD, Superintendent of Schools, Limaville, Ohio.

Show that, in the wheel and axle, when a force P, acting at the circumference of the wheel, supports a weight Q upon the axle,

$$P.(R\mp\rho\sin\varepsilon)=Q(r\pm\rho\sin\varepsilon)\pm W\rho\sin\varepsilon,$$

where R, r, and ρ are the radii of the wheel, the axle, and their common axis respectively, and ε is the limiting angle of resistance.

DIOPHANTINE ANALYSIS.

Conducted by J. M. COLAW, Monterey, Va. All contributions to this department should be sent to him.

SOLUTIONS OF PROBLEMS.

16. Proposed by H. W. DRAUGHON, Olio, Mississippi.

Find three numbers such that the cube of any one plus the sum of the squares of the other two, will be a square.

Solution by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in New Windsor College, New Windsor, Maryland.

Let ax, bxy, and cxz represent the required numbers; then we have $a^3x^3+(b^2y^2+c^2z^2)x^2=\square$ ....(A), $b^3x^3y^3+(a^2+c^2z^2)x^2=\square$ ...(B), and $c^3x^3z^3+(a^2+b^2y^2)x^2=\square$ ....(C). Omitting in (A), (B), and (C), the factor x^2, and putting $x=2bcyz/a^3$, we have (A) as a perfect square.

Substitute this value of x in the first term of (B); then, obviously, the condition that (B) will be a perfect square, is $2b^4cy^4z/a^3=2acz$.

$\therefore y=a/b$....(1). After performing a similar operation in (C), we obtain $2bc^4yz^4/a^3=2aby$. $\therefore$ $z=a/c$....(2).

Consequently $x=2bcyz/a^3=2/a$....(3); and the required numbers are $ax=2$, $bxy=2$, and $cxz=2$.

[NOTE.—Can any of our contributors find three *unequal* numbers answering the conditions of this problem? The proposer and several contributors have reported that they had as yet failed to solve it. The problem seems difficult of solution, or at least the EDITOR does not now see any way clear to a solution of it.]

17. Proposed by ARTEMAS MARTIN, LL.D., U. S. Coast and Geodetic Survey Office, Washington, D. C.

Is it possible to find two positive whole numbers such that each of them and also their sum and difference, when diminished by unity shall all be squares?

Solution by the PROPOSER.

Let x^2+1 and y^2+1 denote the numbers required: then their sum $=x^2+y^2+2$, their difference $=x^2-y^2$, and we have